CLAIMS

~~WE CLAIM:~~

1. A protocol for driving a liquid crystal display, comprising:-
(i) a row (common) driving matrix; said matrix
(ii) consisting of orthogonal block-circulant matrices.

2. A protocol as defined in Claim 1, wherein there are row and column interchanges of said row (common) driving matrix.

3. A protocol as defined in Claim 1, wherein said row (common) driving matrix is an orthogonal block-circulant matrix.

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4. A protocol as defined in Claim, wherein said row (common) driving matrix is a block diagonal matrix and wherein all the building blocks are orthogonal block-circulant.

5. A protocol as defined in Claim 4, wherein said row (common) driving matrix is a row and column interchanged version of the row (common) driving matrix.

6. A protocol as defined in Claim 1, wherein said row (common) driving matrix comprises orthogonal block-circulant building blocks generated by using a paraunitary matrix.

7. A protocol as defined in Claim 6, wherein said driving matrix is

$$\begin{bmatrix} 1 & 0 & 1 & 0 & -1 & 0 & 1 & 0 \\ -1 & 0 & -1 & 0 & -1 & 0 & 1 & 0 \\ -1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ -1 & 0 & 1 & 0 & -1 & 0 & -1 & 0 \\ 0 & 1 & 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & -1 & 0 & -1 & 0 & -1 & 0 & 1 \\ 0 & -1 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & -1 & 0 & 1 & 0 & -1 & 0 & -1 \end{bmatrix}$$

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8. A protocol as defined in Claim 1, wherein said row (common) driving matrix is based on orthogonal block-circulant building blocks generated by nonlinear programming.

9. A protocol as defined in Claim 8, wherein said row (common) driving matrix is based on order-4 orthogonal block-circulant building blocks.

10. A protocol as defined in Claim 8, wherein said row (common) driving matrix is based on order-8 orthogonal block-circulant building blocks.

11. A protocol as defined in Claim 9, wherein said building blocks comprise

(1)

$$\begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix};$$

(2)

$$\begin{bmatrix} -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix};$$

(3)

$$\begin{bmatrix} -1 & 1 & -1 & -1 \\ 1 & 1 & -1 & 1 \end{bmatrix};$$

(4)

$$\begin{bmatrix} -1 & -1 & -1 & 1 \\ 1 & 1 & -1 & 1 \end{bmatrix};$$

(5) all alternatives of (1)-(4) generated by

(i) sign inversion (i.e., $-E$);
(ii) row interchange, i.e.,

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} E;$$

(iii) circulant shift of E, i.e.,

$$ER_{4,2}$$

and any combinations of (i)-(iii).

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0 9 5 6 4 5 5 8 . 1 4 0 2 0 2

12. A protocol as defined in Claim 10, wherein said building blocks comprise

(1)

$$\begin{bmatrix} 1 & 1 & -1 & 1 & 1 & -1 & 1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 \end{bmatrix};$$

(2)

$$\begin{bmatrix} 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \end{bmatrix};$$

(3)

$$\begin{bmatrix} 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \end{bmatrix};$$

(4)

$$\begin{bmatrix} 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 \end{bmatrix};$$

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(5)

$$\begin{bmatrix} -1 & 1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

(6)

$$\begin{bmatrix} -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

(7)

$$\begin{bmatrix} -1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & -1 & 1 & 1 & -1 \end{bmatrix};$$

(8)

$$\begin{bmatrix} -1 & 1 & 1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

(9)

$$\begin{bmatrix} -1 & 1 & 1 & 1 & 1 & 1 & 1 & -1 \\ 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(10)

$$\begin{bmatrix} -1 & 1 & -1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & -1 & -1 & -1 & -1 & -1 & -1 \end{bmatrix};$$

(11)

$$\begin{bmatrix} -1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 \\ 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(12)

$$\begin{bmatrix} 1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

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(13)

$$\begin{bmatrix} 1 & -1 & -1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

(14)

$$\begin{bmatrix} 1 & -1 & 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & -1 & -1 \end{bmatrix};$$

(15)

$$\begin{bmatrix} 1 & -1 & -1 & 1 & -1 & -1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 \end{bmatrix};$$

(16)

$$\begin{bmatrix} 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & 1 & 1 & 1 & 1 & -1 & -1 & 1 \end{bmatrix};$$

(17)

$$\begin{bmatrix} 1 & -1 & 1 & 1 & 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 & 1 & -1 & -1 & -1 \end{bmatrix};$$

(18)

$$\begin{bmatrix} 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(19)

$$\begin{bmatrix} 1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(20)

$$\begin{bmatrix} 1 & 1 & -1 & 1 & 1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 \end{bmatrix};$$

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(21)

$$\begin{bmatrix} 1 & 1 & 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 \end{bmatrix};$$

(22)

$$\begin{bmatrix} -1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(23)

$$\begin{bmatrix} -1 & -1 & -1 & 1 & 1 & -1 & -1 & -1 \\ 1 & 1 & -1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(24)

$$\begin{bmatrix} -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(25)

$$\begin{bmatrix} 1 & -1 & 1 & 1 & -1 & 1 & 1 & 1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(26)

$$\begin{bmatrix} 1 & -1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & 1 & 1 & -1 & 1 & -1 & -1 \end{bmatrix};$$

(27)

$$\begin{bmatrix} 1 & -1 & 1 & -1 & 1 & 1 & -1 & -1 \\ -1 & 1 & 1 & -1 & -1 & -1 & -1 & -1 \end{bmatrix};$$

(28) all alternatives of (1)-(27) generated by

(i) sign inversion (i.e., $-E$);

(ii) row interchange, i.e.,

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} E;$$

(iii) circulant shift of E, i.e.,

$$ER_{8,2i}$$

i=1, 2, or 3, and any combinations of (i)-(iii)

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~~13. A liquid crystal display, wherein there is a driving scheme, and a protocol as defined in Claim 1.~~